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THE VALUE OF TIME IN PLEASURE TRAVEL

By Thomas R. Craig†

A MAJOR problem of the airline industry is to find ways and means of penetrating the whole automobile travel market. One part of this problem is to induce the pleasure traveler to leave his car at home and go by air. Logically, a a vacationer wishes to spend as much time as possible at his destination. Against this desire he must weigh the cost of getting there quickly. That so much vacation travel is performed by car suggests he finds the cost of getting to his destination quickly by air too expensive a proposition. Though it is much slower, the car costs less as a means of transportation. The traveler is apparently willing to spend quite a bit of his vacation time traveling to and from his destination. In other words, he is willing to exchange time for money. Therefore he places some value upon his travel time. How much value is of considerable interest to the airline industry. Value of travel time will establish one of the factors that must be considered in setting a competitive air fare to bring the automobile pleasure traveler to the airplane. The following discussion is an endeavor to develop a practical formula for estimating the value we should place on time spent in pleasure travel.

Right at the beginning we are going to define our pleasure travelers as those who are interested solely in going to a destination. These people will view time in transit as a necessary evil and not as a chance to do some additional sightseeing. The enroute pleasure seeker introduces too many complications in unraveling the value he puts on his travel time. For our approach to the problem of determining the value of travel time, we shall start with a fairly simple formula. With the basic formula established, by a building-block process we can add on additional elements to refine the results.

Without further ado, then the basic formula is:

$$V = (F - C) \div (T_c - T_f)$$

where:

$V =$ the value of travel time per hour;
$F =$ the total cost of air fare and related ground transportation;
$C =$ the total operating cost of the car and related travel costs including lodging and meals;
$T_c =$ door to door travel time by surface carrier;
$T_f =$ door to door travel time by air.

We now have a formula which is an expression of the rate per hour of saving money for the pleasure traveler who chooses to go by car rather than air. It says therefore that the value of time in pleasure travel is predicated upon saving money. There is nothing new in the concept, but the formula defines the rate at which money is saved.

Here are two theoretical trips, one of 1,000 miles and one of 160 miles.

CASE I (1,000 miles)	CASE II (160 miles)
$F = \$76.00$	$F = \$25.00$
$C = \$48.00$	$C = \$\ 4.80$
$T_c =$ 32 hours	$T_c =$ 4 hours
$T_f =$ 4 hours	$T_f =$ 2 hours
$V = (F - C) \div (T_c - T_f)$	$V = (F - C) \div (T_c - T_f)$

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$V = (76 - 48) \div (32 - 4)$	$V = (25.80 - 4.80) \div (4 - 2)$
$V = 28 \div 28$	$V = 21.00 \div 2$
$V = \$1.00/\text{hr.}$	$V = \$10.50/\text{hr.}$

(See Appendix I for details of cost and time build-up)

What quickly becomes clear from the formula is the overwhelming pressure for the pleasure traveler contemplating the short trip to go by car. The savings are so substantial that all other considerations become negligible. But on the long trip the value of time per hour is not nearly so eye-opening. Nevertheless the savings to the pleasure traveler are still large enough that the car might be considered.

To carry the idea further, we can now look at our first refinement: When choosing the mode of travel the decision is influenced by the total vacation time available. There is not much point in traveling five days to spend two at a vacation resort. We conclude therefore that the value of travel time is a function of total trip time and for our purposes can be expressed as follows:

$$V = f\left(1 - \frac{2T_{\Delta}}{T_t}\right)$$

where:

T_{Δ} = the one way difference in travel time between the two modes or $(T_c - T_f)$;

T_t = the total trip time including both travel time and time at destination expressed in hours.

Returning to our two cases we can arrange them as follows:

CASE I (1,000 miles)		CASE II (160 miles)	
Example A	Example B	Example A	Example B
Let $T_t = 14$ days or 336 hrs.	Let $T_t = 4$ days or 96 hrs.	Let $T_t = 3$ days or 72 hrs.	Let $T_t = 1$ day or 16 hrs.
$1 - \frac{2\,T_{\Delta}}{T_t} =$	$1 - \frac{2\,T_{\Delta}}{T_t} =$	$1 - \frac{2\,T_{\Delta}}{T_t} =$	$1 - \frac{2\,T_{\Delta}}{T_t} =$
$1 - \frac{2 \times 28}{336} =$	$1 - \frac{2 \times 28}{96} =$	$1 - \frac{2 \times 2}{72} =$	$1 - \frac{2 \times 2}{16} =$
$1 - .17 =$	$1 - .58 =$	$1 - .06 =$	$1 - .25 =$
.83	.42	.94	.75

The Value of "V" for Case I and Case II now reflects the total travel time and expressed in dollars and cents we have:

	CASE I	CASE II
Example A	$V = \$1.00 \times .83 = \$\ .83$	$V = \$10.50 \times .94 = \$9.87$
Example B	$V = \$1.00 \times .42 = \$\ .42$	$V = \$10.50 \times .75 = \$7.88$

Looking at Case II first, we can say that no matter what the total trip time is, it makes economic sense to the traveler to go by car. The time differential between air and car on short trips is not great enough to materially affect the original large savings. We now turn to Case I, the 1,000 mile trip. When we have a two week vacation, the saving in going by car is still significant. In other words when total travel time represents a small proportion of total trip time, the saving in going by the slower mode remains high, but for a four day trip, we are beginning to pay heavily to go by car, and our total savings fall off rapidly (in our hypothetical Example B, by almost sixty per cent). We have shown nothing startling here. Everyone knows that if you have only a few days in which to take a long trip, if you are to go at all, you must go by air. But we have formalized the thinking process and given a real value to the time concept involved.

To go on, we can now write our value formula in the following form:

$$V = \left(1 - \frac{2T_\Delta}{T_t}\right)\left([F - C] \div [T_c - T_f]\right)$$

In case the $T_\Delta \times 2$ is confusing, remember T_Δ is only one way travel time. We have to get home again, and we are assuming return trip time equals outbound.

There remains one major consideration to cover in our discussion. We need to make the calculated value of time meaningful in terms of our pleasure traveler's pocketbook. It says little to state "you can save $10.00 by going by car" if we know nothing about the saver's own disposable income. In general we can say that as disposable income goes up, the value of time in pleasure travel goes down. In other words it becomes less important to save money by taking the car. We can express this relationship simply by saying that:

$$V = f\left(\frac{C_\Delta}{I}\right)$$

where:

$C_\Delta =$ the cost differential of travel by air and by surface $(F - C)$;

$I =$ daily disposable income computed by dividing annual disposable income by 260 (twenty-six pay periods of ten working days each) for recreation and travel only.

We can now look at our two cases under an assumption of $10,000 disposable income and another of $2,500 annual disposable income:

CASE I (1,000 miles)	CASE II (160 miles)
Example A (14 day trip) $V = \$\ .83$	Example A (3 day trip) $V = \$9.87$
Example B (4 day trip) $V = \$\ .42$	Example B (1 day trip) $V = \$7.88$

CASE I		CASE II	
$10,000 Disposable Income	$2,500 Disposable Income	$10,000 Disposable Income	$2,500 Disposable Income
$\frac{C_\Delta}{I} =$	$\frac{C_\Delta}{I} =$	$\frac{C_\Delta}{I} =$	$\frac{C_\Delta}{I} =$
$\frac{28}{38.50} =$	$\frac{28}{9.61} =$	$\frac{21}{38.50} =$	$\frac{21}{9.61} =$
.73	2.91	.55	2.19

Example A		Example A	
V (14 day) =	V (14 day) =	V (3 day) =	V (3 day) =
$ .83 x .73 =	$ .83 x 2.91 =	$9.87 x .55 =	$9.87 x 2.19 =
$ .61	$2.42	$5.43	$21.61

Example B		Example B	
V (4 day) =	V (4 day) =	V (1 day) =	V (1 day) =
$ .42 x .73 =	$ .42 x 2.91 =	$7.88 x .55 =	$7.88 x 2.19 =
$ .31	$1.22	$4.33	$17.26

Again we can dismiss Case II quickly for the man who must count his pennies. The rate of savings are so significant that the use of the car is dictated. However, on the one day trip the value of time to our affluent traveler has decreased sufficiently that he will consider air, for here our computed value of time for him is less than his hourly rate of acquisition of discretionary income (about \$4.80 an hour) and even on the three day trip the use of air is by no means ruled out.

In Case I, in both the fourteen day and the four day trip we reduce still further the value the wealthy traveler places on time, and air is the clearly indicated mode of travel. For our other traveler with a fourteen day trip ahead, use of the car is suggested. His travel time is more valuable than his rate of acquisition of discretionary income (about \$1.90 per hour) but with only a long weekend ahead (the four day vacation) air also is the dictated mode if he chooses to go at all.

We can now complete our formula:

$$V = \frac{C_\Delta}{I}\left(1 - \frac{2\,T_\Delta}{T_t}\right)\left[(F - C) \div (T_c - T_f)\right]$$

where:

V = the hourly value of time for pleasure travel;

C_Δ = the differential in the cost of two modes of travel;

I = daily disposable income computed by dividing annual disposable income by 260 (twenty-six pay periods of ten days each);

T_Δ = the difference in travel times between the two modes in hours;

T_t = the total trip time including both travel time and time at destination expressed in hours;

F = the total cost of the air trip;

C = the total cost of the surface trip;

T_c = door to door time by surface carrier;

T_f = door to door time by air.

As a test of practicality of this formula we will apply it to an average trip for the average United States citizen for 1960. Assume a ten day vacation for total time. In 1960, the average air trip was 544 miles. Computing the costs for a family of four (two adults and two half fare children) we have a ticket cost of 544 x \$ .065 x 3 = \$106.08. Surface costs are 544 x \$ .03 plus food and lodging = \$16.32 plus \$40.50 = \$56.82 (Appendix II). Discretionary income per year computed at \$1,640 = \$6.31 per day (Appendix III). To give the air the best possible chance we will assume that friends provide transportation to and from the airport at both ends so that air fare alone is the total cost. Then:

$$V = \frac{C_\Delta}{I}\left(1 - \frac{2T_\Delta}{T}\right)\left[(F - C) \div (T_c - T_f)\right]$$

$$V = \frac{49.26}{6.31}\left(1 - \frac{2 \times 21.5}{240}\right)\left[(106.08 - 56.82) \div (24 - 2.5)\right]$$

$$V = 7.81 \times .18 \times [49.26 \div 21.5]$$

$$V = 1.41 \times 2.29$$

$$V = \$3.23 \text{ per hour}$$

Since hourly discretionary income is about seventy-nine cents it is clear the average family should decide to go by surface. The conclusion is strongly supported by the actualities of the United States domestic travel market. For 1957, the last year for which we have available data eighty-two per cent of all trips were made by car and only five per cent by air.

Holding all the variables constant except the number of people in the party produces the following values of time for the family head:

1 person	V = $ .02	4 people	V = $ 7.48
2 people	V = $1.15	5 people	V = $11.97
3 people	V = $3.23	6 people	V = $19.39

When more than two people are involved in travel, the use of the car is dictated. One person going alone should fly; for two people it is optional.

We have now one last point. Using the value of time to the head of the family when he chooses between two modes of travel—air and surface—one can calculate the suggested air fare that is likely to capture his business. The fare is simply that fare which makes "V" equal to hourly discretionary income—seventy-nine cents. Under this assumption we have:

	Air Fare Per Mile Per Person
2 people	.06
3 people	.05
4 people	.042
5 people	.039
6 people	.035

We do not suggest that the air fares shown above would automatically capture a large part of the pleasure travel market going by car. It does seem clear, however, that the airlines cannot make a serious attempt to induct more pleasure travelers to fly until they are able to reduce fares for pleasure travel. Fares should approach a level which would make the rate of saving of going by car no more than the rate of acquisition of disposable income for pleasure travel. At that fare level, the extra cost of the plane per hour is no greater than the traveler's rate of acquisition of discretionary travel income per hour. In view of the great time saving of going by air, it seems reasonable that the average pleasure traveler would be willing to pay this much for speed.

APPENDIX I

CAR COSTS

Assume $ .03/mile car costs based on direct operating costs. Costs developed as follows:

Gas	$ .018	18 m/p/g and 32.9¢/g
Oil	.0005	1,000 mi. and 50¢/qt.
Tires	.0035	$105 for four and 30,000 miles of service
Grease	.002	$2.00 at 1,000 mi.
Miscellaneous	.006	repairs, special grease jobs, tune ups, battery, anti-freeze
Total	$ .0300	

Items such as insurance, depreciation, and licenses are not included since they are costs incurred whether the car is driven or not. For a 1,000 mile trip, meals and lodging are $20.00 (four meals and one overnight stay).

The air fare assumes the use of a taxi at one terminal for $7.00 and a bus at the other for $2.00. Air fare for long trips is 6.7 cents per mile. For short trips, 10.5 cents per mile.

COST BUILD-UP FOR TWO TRIPS

CASE I (1,000 miles)				CASE II (160 miles)			
Air		Surface		Air		Surface	
Ticket	$67.00	Car	$30.00	Ticket	$16.80	Car	$4.80
Ground	9.00	Food	8.00	Ground	9.00	Food	—
Total	$76.00	Lodging	10.00	Total	$25.80	Lodging	—
		Total	$48.00			Total	$4.80

Assumes only one overnight stay on surface trip.

TIME ASSUMPTIONS

CASE I (1,000 miles)

Air time is four hours, two hours flight time and one hour ground time on each end.

Surface time is thirty-two hours, twenty hours driving at 50 m.p.h. average speed, twelve hours eating and sleeping.

CASE II (160 miles)

Air time is two hours, thirty minutes flight time and forty-five minutes ground time on each end.

Surface time is four hours driving at 40 m.p.h. average speed, sixteen hours used for one day trip. (Assumes getting up at 6 A.M. and going to bed at 10 P.M.)

APPENDIX II

BUILD-UP OF COSTS FOR AVERAGE FAMILY

No. of People	Air Fare	Food[1]	Lodging[2]	Car	Total
1	$ 35.36	$ 6.50	$ 9.00	$16.32	$31.82
2	70.72	13.00	12.00	16.32	41.32
3	106.08	19.50	21.00	16.32	56.82
4	141.44	26.00	24.00	16.32	66.32
5	176.80	32.50	33.00	16.32	81.82
6	212.16	39.00	36.00	16.32	91.32

[1] Assumes purchase of lunch, dinner and breakfast at costs of $1.25, $4.00 and $1.25.
[2] Assumes $9.00 for a single and $12.00 for a double.

APPENDIX III

Development of discretionary income figure is taken from the *Statistical Abstract of the United States* for 1962.

Personal consumption expenditures for the nation on page 315 is the specific data source.

	1960
Transportation	$40,715,000,000
Recreation	19,408,000,000
Foreign Travel	2,950,000,000
Sub Total	$63,073,000,000
Ten per cent of remaining personal consumption	26,585,000,000
Sub Total	$89,658,000,000
Less cost of new cars	$15,800,000,000
Total discretionary income for travel and recreation purposes.	$73,858,000,000
Number of United States families, 1960	45,002,000
Discretionary income for each family per year	$1,640.00
per day	$ 6.31
per hour	$ .79